

Reference #1
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The Stratigraphic Succession in Missouri

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Division of
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the Paleozoic Systems up to and including the Pennsylvanian. In the southeastern part of the state in the lowland area the rock succession is thicker but most of the Paleozoic Systems are missing. As much as 4 700 feet of post-Precambrian rock has been penetrated by one of the deepest wells in the area but only the deepest part of this well is in Paleozoic rock of Cambrian age. The balance of the succession is composed of Cretaceous and Tertiary rocks.

The structural attitude of the Paleozoic rocks throughout the state is controlled principally by the shape of the Ozark uplift the apex of which forms the core of the St. Francois Mountains. Paleozoic strata dip away in all directions from the periphery of the St. Francois Mountains into surrounding structural basins: the Forest City basin to the northwest, the Illinois basin to the northeast, the Anadarko basin to the southwest, the Arkoma basin to the south, and the depression of the Mississippi Embayment to the southeast. Some of the more prominent secondary structural features which locally affect the attitude of Paleozoic strata within the state are the Lincoln fold in northeastern Missouri, the Mineola arch in central Missouri, the Cap au Gres fault north of St. Louis, the Little Saline fault complex in Ste. Genevieve County, and the Chesapeake fault zone southwest of Springfield.

Cambrian System

by

William C. Hayes and Robert D. Knight

Upper Cambrian Series

All the Cambrian strata in Missouri are regarded as Late Cambrian in age. The unconformity at the base of the Series is particularly striking in the St. Francois Mountain area where prominent ridges and knobs of Precambrian granite and felsite are in contact with Cambrian strata. The lower part of the Series consists of a quartzose sandstone, the upper part of dolomite and shale. Exposures of the sandstone are generally limited to the St. Francois Mountain area where they overlap the flanks of Precambrian knobs. Outcrops of successively higher units occur in peripheral annular patterns around the area. Away from the uplift, Upper Cambrian formations dip beneath younger Paleozoic strata and are present in the subsurface throughout the state except in those areas where they have overlapped Precambrian topographic highs and have been subsequently removed by erosion.

The combined thicknesses of the strata which form the Upper Cambrian Series in Missouri total approximately 2 000 feet. The Series contains six formations, two of which form a group. In order of decreasing age they are as follows: the Lamotte, Bonnetterre, Davis, Derby, Doerun, Potosi, and Eminence formations. The Davis and Derby Doerun together form the Elvins group.

Lamotte formation —The Lamotte is predominantly a quartzose

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sandstone that in many places grades laterally into arkose and conglomerate Pebbles and boulders of felsite are the chief constituents of the conglomerates which immediately overlie Precambrian rocks in many places The color of the sandstone ranges from light gray or white to yellow brown or red Red to purple silty shale is locally present, and lenses of arenaceous dolomite are scattered through the upper part of the formation

The Lamotte attains its maximum thickness of about 500 feet in the depressions between Precambrian ridges and knobs Where the formation onlaps these knobs and hills it pinches out and is overlapped by younger formations

Exposures of Lamotte are in general restricted to the St Francois Mountain area in Madison Ste Genevieve Iron and southeastern Washington Counties The Lamotte appears to be absent in west-central Madison County The formation is persistent in the subsurface throughout Missouri except on Precambrian highs where younger formations overlap it Regional variations in thickness of the Lamotte within the state are indicated by the following data In Howell County the formation is approximately 200 feet thick in Laclede County it is 300 feet thick in Barry County 125 feet and in Ralls County 340 feet In Nemaha County Nebraska across the Missouri River from Atchison County in northwestern Missouri it is 65 feet thick

The Lamotte is quarried for dimension stone in the St Francois Mountain area

Bonneterre formation—The Bonneterre is typically a light gray medium- to fine grained medium bedded dolomite but consists of relatively pure limestone in some areas In places it is very coarse grained and it contains small cavities which are lined with dolomite rhombs Locally, parts of the Bonneterre are glauconitic and shaly with the shale occurring in beds less than 2 inches thick In some areas the formation contains beds of relatively pure thin bedded pink limestone which is referred to as Taum Sauk marble

In the Fredericktown area the formation has been divided into six units on the basis of insoluble residues In the Lead Belt eight principal units are recognized although all are not identifiable at any one locality Because of the importance of the formation as a host rock to the ore deposits of the Lead Belt the Bonneterre has been studied in more detail there than elsewhere Structures that are important as ore controls are elastic carbonate bars or ridges algal structures and masses of submarine breccia Major lead production to date has been from the lower half of the formation Wherever the Bonneterre has been deposited near or directly on the Precambrian surface it contains pebbles and cobbles of igneous rock much of which is felsite The host rock at the St Joseph Lead Company's Hayden Creek mine is a granite conglomerate cemented by dolomite The ore is present in the dolomite and fills fractures in the granite boulders

The relationship of the Bonneterre and the underlying Lamotte is one of conformity The lower part of the Bonneterre consists of alternating beds of dolomite and arenaceous dolomite with the amount

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	CROSSBEDDED LIMESTONE		SAND AND GRAVEL
	DOLOMITIC LIMESTONE		CONGLOMERATE
	OOLITIC LIMESTONE		EDGEWISE CONGLOMERATE
	NODULAR LIMESTONE		LIMESTONE BRECCIA
	LIMESTONE CONTAINING CAVITIES LINED WITH QUARTZ DRUSE		LIMESTONE CONCRETIONS
	DOLOMITE		CLAY IRONSTONE CONCRETIONS
	SHALE		SEPTARIAN CONCRETIONS
	SILTSTONE		CRYPTOZOANS
	SANDY SHALE		GLAUCONITE
	CALCAREOUS SHALE		COAL
	SHALE CONTAINING PHOSPHATIC CONCRETIONS		FELSITE EXTRUSIVES
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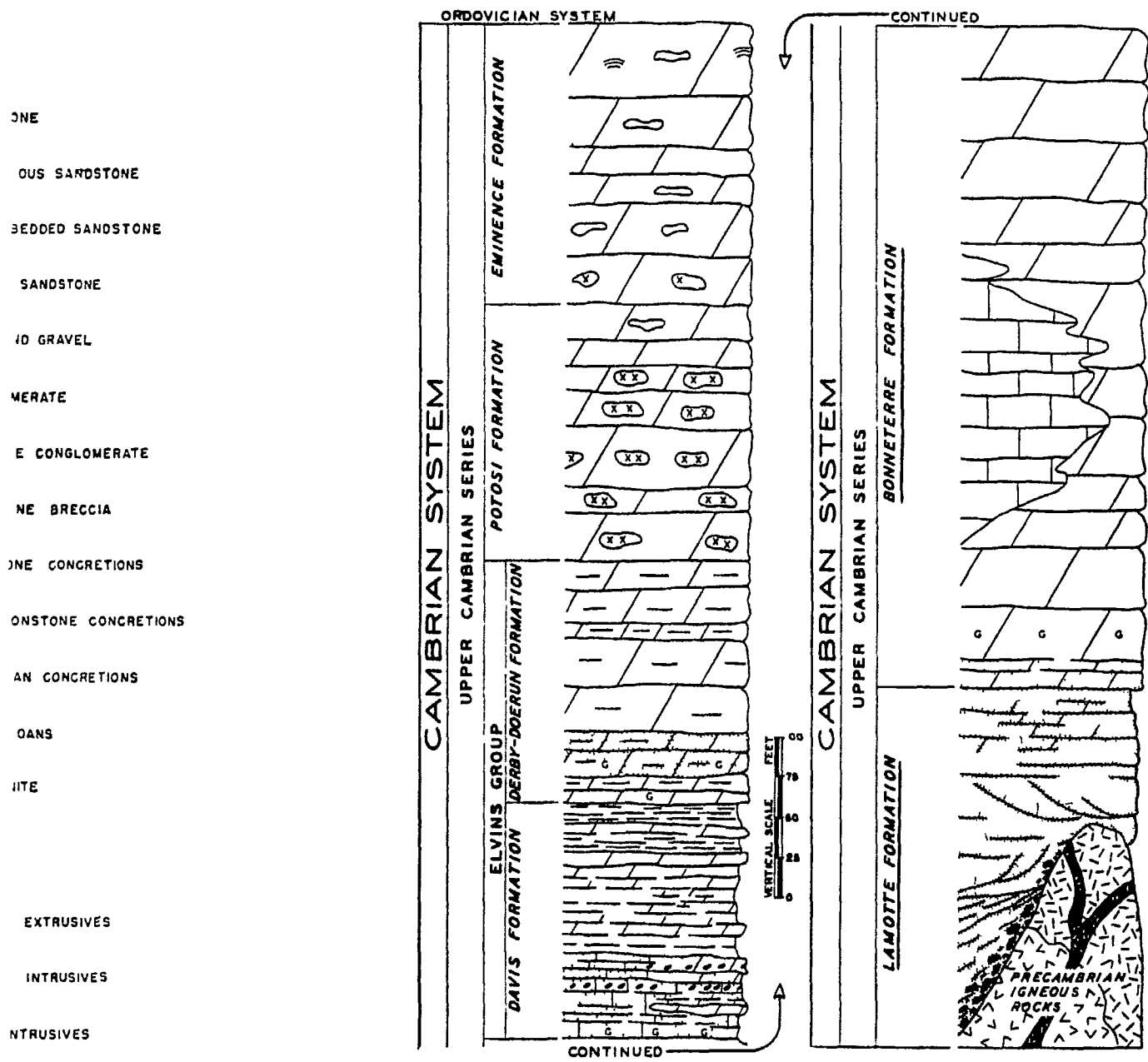


Fig 3 Cambrian System Upper Cambrian Series

of sand increasing toward the base. This sandy zone is usually 10 to 20 feet thick but may approach a thickness of 200 feet. The Bonnetterre overlaps the underlying Lamotte on the flanks of Precambrian highs.

Most of the Bonnetterre exposures lie to the north and east of the main area of Precambrian exposures and the formation is concealed by younger beds to the west and south. It occurs in the subsurface throughout most of the state and attains a maximum known thickness of 1 580 feet in the subsurface in Pemiscot County. In the Lead Belt the formation has an approximate thickness of from 375 to 400 feet

ELVINS GROUP —The Elvins group which consists of the Davis and Derby Doerun formations is a readily recognizable unit anywhere in the state. The lower part is shaly in the Lead Belt area but becomes predominantly dolomitic to the south. The upper part of the Elvins consists of fine grained thin to medium bedded shaly dolomite.

Davis formation —The Davis is the lower of the two formations which make up the Elvins group. The formation is conformable with the underlying Bonnetterre and contains shale siltstone fine grained sandstone dolomite and limestone conglomerate. Shale is more prevalent in the Lead Belt than elsewhere. Much of the siltstone and fine grained sandstone is glauconitic and has a 'salt and pepper' appearance.

An important marker in the Davis is the *Coorthis* brachiopod zone which is usually confined to a bed 1 or 2 feet thick that lies 30 or 35 feet below the top of the formation.

Flat pebble and edgewise conglomerates are characteristic of the Davis. The 'flat pebble' conglomerates consist of rounded disc-like pebbles of fine-grained limestone that are embedded in a medium grained limestone matrix. The pebbles lie with their flat surfaces more or less parallel to the bedding planes. In the imbricate or edgewise conglomerates the discs or lenses of fine grained limestone are generally arranged with their longer axes perpendicular to or steeply inclined to the bedding planes. In some places a group of edgewise pebbles will form a radiating or fanlike pattern.

Rounded boulder size masses of light colored fine grained mottled limestone are present about 60 feet below the top of the Davis in the Lead Belt area. This horizon is informally referred to as the 'Marble boulder bed'.

The formation averages 170 feet in thickness. Its maximum recorded thickness is 225 feet. It thins to a feathered edge wherever it overlies Precambrian knobs.

Derby-Doerun formation —The Derby and the overlying Doe Run formation were originally defined in 1908 from exposures in the vicinity of mines operated by the Derby Lead Company and the Doe Run Lead Company in the Lead Belt area at that time. However the conformable relationship and similar lithology of the two units has since led most stratigraphers to consider them as a single unit and the